

ORIGINAL

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Kenneth Rust
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EX PARTE OR LATE FILED



July 27, 1999

Ex Parte

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 12th Street, SW
Washington, DC 20554

RECEIVED
JUL 27 1999
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Re: CC Docket No. 98-166

Dear Ms. Salas:

In an ex parte meeting on June 8, 1999, in the matter captioned above, reference was made to additional information and material regarding market capitalization. The ILEC representatives met with Tony Dale, Tom David, Rick Robinson, Gary Siegel, and George Williams, of the FCC's Common Carrier Bureau. The additional material made reference to by the parties at the June 8 meeting and in the accompanying presentation is attached, and we request that it be made a part of the record in the proceeding noted.

If you have any questions regarding the attached, please contact me at the address shown above.

Sincerely,

A handwritten signature in cursive script, appearing to read "Kenneth Rust".

Attachments

cc:

A. Dale
T. David
R. Robinson
G. Siegel
G. Williams

No. of Copies rec'd 0+1
List A B C D E

Market Price Appreciation Over the Last Five Years: Compound Annual Growth Rates

Bell Regional Holding Companies and GTE versus S&P Industrials

<u>Company</u>	1994 Close Price	1994 Shares	1994 Value	1995 Close Price	1995 Shares	1995 Value	1996 Close Price	1996 Shares	1996 Value	1997 Close Price	1997 Shares	1997 Value	1998 Close Price	1998 Shares	1998 Value	<u>CAGR</u> 1994-1998	5/31/99 Close Price	3/31/99 Shares	5/31/99 Value	<u>CAGR</u> 1994-5/31/99
BEL	49.75	436.2	21,701	66.875	437.7	29,271	64.75	437.75	28,344	91	776.55	70,666	54	1553.4	83,884		54.75	1552.285	84,988	
AIT	40.375	551.45	22,265	58.875	553.85	32,608	60.625	549.95	33,341	40.25	1098	44,195	63.38	1099	69,655		65.813	1098.547	72,299	
BLS	27.062	992.5	26,859	43.5	994	43,239	40.5	991	40,136	56.312	992	55,862	49.88	1950	97,266		47.188	1907	89,988	
NYN	36.75	423.6	15,567	54	432.4	23,350	48.125	440.1	21,180			-			-				-	
PAC	28.5	424.1	12,087	33.5	428.4	14,351	36.75	428.3	15,740			-			-				-	
SBC	40.375	609.1	24,592	57.25	609.35	34,885	51.875	599.85	31,117	73.25	918.65	67,291	53.63	1959.3	105,077		51.125	1963.84	100,401	
USW	35.625	469.3	16,719	35.625	473.6	16,872	32.25	480.5	15,496	45.125	484.5	21,863	64.63	502.9	32,502		54.063	503.494	27,220	
RHC Total			139,790			194,576			185,354			259,876			388,384	29.1%			374,896	25.0%
GTE	30.38	965.1	29,320	43.88	975.1	42,787	45.38	963.1	43,705	52.25	958	50,056	65	968	62,920	21.0%	63.063	970.377	61,195	18.1%
RHCs + GTE			169,110			237,364			229,059			309,932			451,304	27.8%			436,090	23.9%
S&P Industrials			547.51			721.19			869.97			1121.38			1479.41	28.2%			1562.23	26.8%

\$rhxc99

TICKER	COMPANY NAME	COMMON O/S Price		COMMON O/S Year-End Price		COMMON O/S Year-End Price		COMMON O/S Year-End Price		COMMON O/S Year-End Price		COMMON O/S Year-End Price	
		5/31/99	5/31/99	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL	ANNUAL
		1998	1998	1998	1998	1997	1997	1996	1996	1995	1995	1994	1994
AIT	AMERITECH CORP	1098.547	65.813	1099.0	63.38	1098.0	40.25	1099.9	30.31	1107.7	29.44	1102.9	20.19
T	AT&T CORP	3807.535	55.500	2630.4	50.50	2436.3	40.87	2435.2	28.92	2394.0	43.17	2353.5	33.50
BEL	BELL ATLANTIC CORP	1552.285	54.750	1553.4	54.00	1553.1	45.50	875.5	32.38	875.4	33.44	872.4	24.88
BLS	BELLSOUTH CORP	1907.000	47.188	1950.0	49.88	1984.0	28.16	1982.0	20.25	1988.0	21.75	1985.0	13.53
GTE	GTE CORP	970.377	63.063	968.0	65.00	958.0	52.25	963.1	45.38	975.1	43.88	965.1	30.38
WCOM	MCI WORLD COM INC	1856.594	86.375	1835.8	71.75	909.2	30.25	885.1	26.06	386.5	17.63	319.3	9.72
SBC	SBC COMMUNICATIONS INC	1963.840	51.125	1959.3	53.63	1837.3	36.63	1199.7	25.94	1218.7	28.63	1218.2	20.19
FON	SPRINT FON GROUP	346.300	112.750	344.5	84.13	430.0	58.63	430.1	39.88	349.2	39.63	348.3	27.63
USW	U S WEST INC	503.494	54.063	502.9	64.63	484.5	45.13	480.5	32.25	473.6	35.63	469.3	35.63

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Telecommunications Services

The data carriers: Initiating coverage of the CLEC industry

Highlights

- The data revolution is changing the way businesses communicate and redefining the role of the traditional service provider. Competitive local exchange carriers (CLECs) are capitalizing on these changes and rapidly taking share in the \$175 billion domestic telecommunications services market.
- With less than a 5% aggregate share and forecasts for up to 40% penetration of business lines in some markets, the CLECs remain in the early stages of their growth cycle. Competing with recent monopolists in an industry requiring increased levels of customer service and product customization is a business case we believe to be very attractive.
- Data service provision is an attractive business. Top performers experience sequential revenue growth of 15-25% per quarter and gross margins ranging from 50% to 75%. The local service market itself has compelling economics. In 1997, the RBOCs, which account for approximately 85% of the market, earned a return on equity of 28%, posting operating cash flow margins of 42% with 13% net margins.
- The removal of regulatory barriers has ignited a new round of consolidation as traditional carriers try to assemble comprehensive product portfolios and end-to-end networks. Data-focused CLECs have the infrastructure required to service high-margin business customers and a competency in the products that many of their competitors lack.
- We initiated coverage of GST Telecommunications (GSTX \$15 15/16) with a Buy rating and a 12-month price target of \$20 per share, Intermedia (ICIX \$41 3/16) with a Buy rating and a 12-month price target of \$50 per share, e.spire Communications (ESPI \$21 9/32) with an Attractive rating and a 12-month price target of \$24 per share, and Electric Lightwave (ELIX \$11 3/4) with a Neutral rating.

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Portfolio Manager's Summary

Competitive local exchange carriers (CLECs) are exploiting changes created by deregulation and the rapid growth of data services. The Telecommunications Act allows the CLECs to compete on favorable terms with the Regional Bell Operating Companies (RBOCs) despite having little infrastructure or operating history. Broad acceptance of data services is changing how business communicates while redefining the role of the traditional carrier. To this add a rate structure mired in cross-subsidies that allows competitors to undercut current pricing of business lines while earning a compelling return on investment. Together, these circumstances have opened the \$175 billion domestic telecommunications services market and set the stage for a 40-50% shift in local service market share.

We believe the CLECs that are able to provision an integrated package of voice, Internet and enterprise data solutions are best positioned to take advantage of long-term growth opportunities. Strong customer support systems and end-to-end networks will enable management to best leverage these capabilities while making them the target of larger carriers working to develop data expertise and acquire local infrastructure.

While voice services represent an enormous opportunity for the CLECs, the strategic implications of data services should not be underestimated. Growth in data services is outpacing that of voice services by a factor of five. We expect services such as Internet access, frame relay, ATM and virtual private networks to account for more than half of the growth in industry revenues over the next five years.

The provision of data services has been a weakness in the RBOCs' product portfolio. These companies were late in developing an Internet strategy and have been guilty of many false starts along the way. RBOC frame relay offerings are currently curtailed by interLATA restrictions and they have yet to develop next-generation data networks. This makes data services an attractive way for the CLECs to differentiate themselves from their incumbent competitors while making them likely takeover targets as the RBOCs begin to expand out of region.

Other characteristics of data services add to their strategic nature. A strong data offering is attractive to the small and mid-sized businesses currently driving much of the growth. These businesses do not have the technical expertise to handle their data networking needs in house, preferring to outsource these functions to customer-focused providers. There are high switching costs associated with data services, which should lower churn in the

industry. This "stickiness" should make the high margins associated with data services more defensible. Bundling data with voice service reinforces these effects, further improving the carrier's economics. Lastly, the evolution of communications traffic and the networks that carry it put data-focused CLECs on the right side of technological change.

The current system of cross-subsidization allows incumbent operators to charge low rates for residential lines by keeping rates for business access lines high. Meanwhile, business customers are cheaper to service due to their proximity to installed switching and transport infrastructure in downtown urban areas. This confused pricing structure allows the CLECs to undercut incumbent pricing on business lines while still earning a healthy return. It also limits the incumbents' ability to mount a competitive response, as raising rates on residential customers is politically unsavory.

The CLECs do not need to worry about cannibalizing existing product lines or reforming a corporate culture developed during the years of "rate-of-return" regulation. CLECs have no legacy systems to convert to handle new products and new billing procedures nor must they offer service to customers that generate low margins. The CLECs do face certain disadvantages, however, including reliance on the capital markets to finance network buildout, a lack of brand recognition and reliance on the Bells for interconnection, collocation and certain aspects of line provisioning.

This is a critical time for the CLECs. In coming quarters, CLEC business access line growth will outstrip that of the RBOCs. We believe this will have a positive effect on investor sentiment, giving confidence to observers who see the CLECs as barely tenable companies nipping at the heels of the incumbents.

We are initiating coverage of four CLECs that are effectively using data services as part of an integrated offering of telecommunications services for the business market. *GST Telecommunications (GSTX)* is our top pick in the sector. We have initiated coverage of GST with a Buy rating and a 12-month price target of \$20 based on our discounted cash flow analysis. *Intermedia Communications (ICIX)* is our other Buy rated name, with a 12-month price target of \$50. *e.spire Communications (ESPI)* is an Attractive rated name with a price target of \$24, and *Electric Lightwave (ELIX)* is a Neutral rated stock.

Investment summary

The race is on. Long-distance companies, Regional Bell Operating Companies, equipment manufacturers and industry observers have all agreed that next-generation networks based on packet technologies will provide the platform on which a wide range of telecommunications services will be delivered in the future. As the data world converges with the voice world, industry participants are rushing to build new networks, deploy new electronics and install new systems in order to keep up with these changes. This comes at a time when deregulation has thrown open the doors to competition and created an environment where small, capital-constrained start-ups can effectively compete against entrenched monopolies.

We believe the CLECs that will be most effective in capitalizing on this opportunity are those that serve the data needs of business customers in the middle market. These companies also represent strategic value to other providers who are late in establishing local infrastructure and data networking expertise. With innovative technology, an absence of legacy systems and customer-driven organizations, these companies are ideally positioned to capitalize on the "data revolution" and may present the best way for investors to play the changes likely to occur as a result of new packet/frame/cell technologies.

This report seeks to explain the fundamental importance of data communication and its increasing role in the telecommunications industry, to describe new services that carriers will increasingly rely upon for revenue growth and to propose investments based on identifying companies with a focused effort to capitalize on these changes.

From evolution to revolution

In just two years, the competitive local exchange carriers have emerged as viable competitors to the RBOCs that now dominate the \$100 billion local phone market in the United States. Deregulation and the explosive growth of data services have created a favorable environment that the CLECs are only beginning to exploit.

Deregulation

The Telecommunications Act of 1996 has opened the \$100 billion local service market much like the Modified Final Judgement (MFJ) brought widespread competition to the \$90 billion long-distance market in 1984. In the years following the MFJ, hundreds of long-distance companies, including facilities-based carriers, wholesalers, switchless resellers and suppliers of dark fiber, emerged to

take advantage of the attractive economics the business offered.

With this in mind, many consumers and lawmakers expected competition in the local market to explode out of the gate when the Telecom Act went into effect some two years ago. True competition has been slower to develop, however, due to the complexity of and high capital intensity associated with providing local service. Where long-distance service requires the deployment of relatively simple long-haul, "point-to-point" circuits, the "many-to-many" quality of local networks makes them largely uneconomical to rebuild completely, given that a competing carrier can expect less than 100% market share. Overcoming this obstacle was one of several issues that added to the complexity of the legislation and set the stage for numerous challenges to its constitutionality.

As it stands, the Telecommunications Act forces incumbent monopolists to wholesale their networks in part or in whole to would-be competitors. This has allowed the CLECs to enter new markets without having to rebuild the local infrastructure in its entirety and has given each company a choice in network deployment.

ILEC vs. CLEC

The competitive local exchange industry remains in the rapid-growth stage of the industry life cycle characterized by rapid expansion, high fixed capital investment, mounting losses and continued entry by new firms.

There are approximately 200 CLECs operating in the United States. This includes larger carriers such as Frontier and LCI that are building local networks, as well as smaller start-ups that have been formed to take advantage of new opportunities. Approximately 30 of these CLECs are publicly traded and more are on the way. Most focus on providing service to the business market, the segment with the most attractive economics. While business lines represent about one-third of the 170 million access lines in service in the U.S. today, they generate approximately 90% of incumbent profits.

At this stage, the CLECs continue to focus on deploying the infrastructure that will enable them to compete with incumbents on a large scale. This means expanding network infrastructure in existing markets, deploying fiber and electronics in new markets, and installing the provisioning and customer support systems required to manage rapid growth effectively. Capital expenditures of the leading independent CLECs continue to grow every year. In 1997, cap ex of the eight leading independent CLECs rose to \$1.7 billion from \$1 billion in 1996. We expect

these providers to spend \$3.3 billion in 1998 and \$3.6 billion in 1999.

the smaller CLECs, we estimate total new lines for the CLECs in the first quarter approached the 542,000 busi-

Figure 1

Cap ex of the major independent CLECs

(US\$ in millions)	1996	1997	1998E	1999E
ELIX	\$16	\$59	\$274	\$285
ESPI	108	135	210	250
GSTX	131	205	250	300
ICGX	221	270	437	450
ICIX	131	260	375	400
MCLD	70	151	240	260
NXLK	52	142	402	480
TCGI	294	463	1,100	1,200
Total	\$1,023	\$1,686	\$3,288	\$3,625
% Change		65%	95%	10%

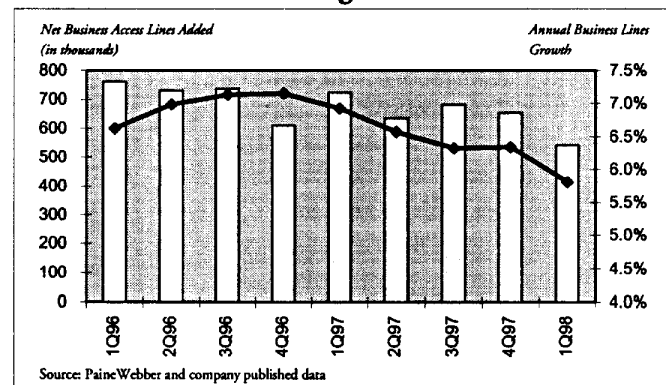
Source: PaineWebber and company published data

Despite all of the attention the CLECs have received, it is important to remember that the industry came into being just two years ago with the signing of the Telecommunications Act in February 1996. Many competitive access providers (CAPs) that would later become CLECs were not prepared to begin selling switched local service until 1997. Largely due to this late start, incumbent providers continue to serve over 95% of installed access lines.

The effects of competition are starting to show, however. In the first quarter of 1998, RBOC business access line growth continued to slow, dropping below 6% for the first time in over three years.

Figure 2

RBOC business access line growth

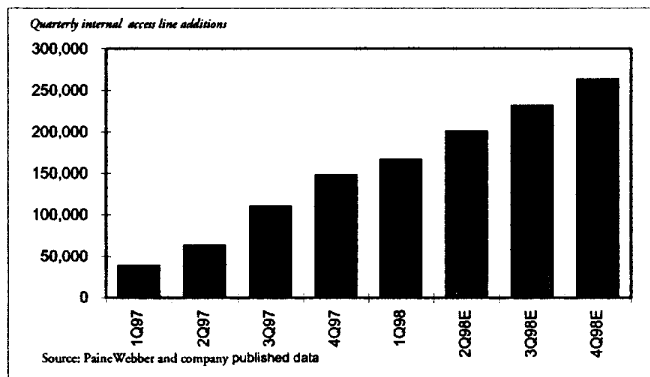


As the CLECs continue to expand into local markets, the number of CLEC access lines added each quarter grows. In the first quarter of 1998, the seven largest independent public wireline CLECs added approximately 169,000 lines, almost five times the number added in the first quarter of 1997. If we add the net new access lines of WorldCom (130,000), Teleport (43,000) and the rest of

ness lines added by the RBOCs. During the second quarter of 1998, the CLECs as a group will surpass the total number of business lines added by the RBOCs.

Figure 3

Quarterly line growth of seven independent CLECs
(ELIX, ESPI, GSTX, ICGX, ICIX, MCLD, NXLK included in charts below)

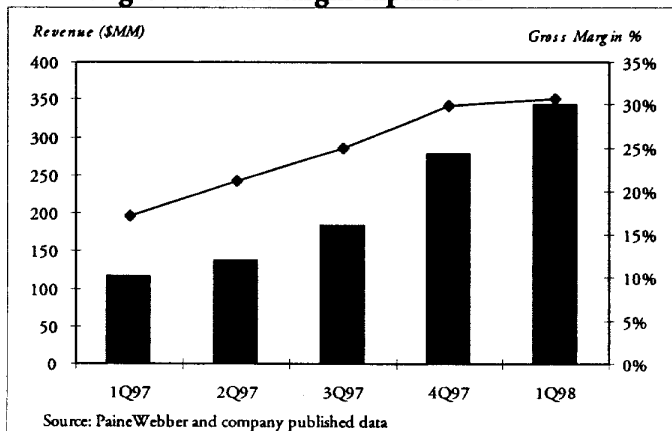


We expect a broad shift in market share over the next ten years as these 200 CLECs converge on the local market. By 2007, 40-50% of the business market is likely to be served by alternative carriers. This loss of share is roughly equivalent to what AT&T experienced in the ten years following liberalization of the long-distance industry. Assuming a 4-5% annual growth rate in total business access lines, this equates to 35-45 million CLEC lines by 2007. With a base of approximately 3 million CLEC lines in service today this assumes a 30% compound average growth rate in access line for the CLECs over the next ten years.

Consistent with the rapid-growth stage of the industry life cycle, the CLECs continue to post heavy losses. Revenue growth, however, is strong and gross margins continue to expand as the CLECs begin to leverage investments in network infrastructure.

Figure 4

Revenue growth and margin expansion



A few CLECs have produced positive operating cash flow while the majority are expected to be EBITDA positive by year-end 1999. Earnings per share are two to three years away for most players.

The data wave

In the midst of this emerging rivalry between ILECs and CLECs, data traffic in the public networks is growing at an astounding rate. The statistics are often trumpeted by the media: Internet traffic doubles every 100 days; fax traffic accounts for approximately 50% of international phone minutes; frame relay and ATM services are growing at double- and triple-digit rates—however, the effects this growth will have on the telecommunications landscape, and its role in determining the outcome of the ILEC-CLEC rivalry have not been a focus.

This wave of data communications is changing the demands businesses place on their service providers. Whereas the phone company typically provided local dial-tone, long-distance and perhaps some private lines, customers of all sizes are now requiring LAN/WAN connectivity and management, shared data services such as frame relay and ATM, dedicated Internet access, virtual private networking, web hosting and the customer support systems necessary to maintain the reliability of these mission-critical applications.

Much of the demand for these new services is the result of a snowball effect produced by the development of new applications, faster microprocessor speeds and increased bandwidth. Listed below are some of the factors that should continue to fuel this growth in demand for data service for the foreseeable future:

- *The increasing popularity of the Internet.* While it is difficult to estimate accurate growth rates, a recent Commerce Department report stated that the number of people connected to the Internet rose from 40 million in 1996 to over 100 million worldwide by year-end 1997.
- *Rapid penetration of personal computers in households and small businesses.* Approximately 45% of U.S. households now have personal computers. Approximately 20% of these are connected to the Internet. The availability of inexpensive PCs and high-speed connectivity should push these figures higher over the next decade. Small companies have increasingly larger

“knowledge components” to their businesses and electronic data interchange and e-commerce are growing rapidly.

- *Wide acceptance of client-server architecture requiring local area network (LAN) connectivity.* As LAN-supported applications proliferated, the need to extend LAN connectivity to remote offices has increasingly required companies to install private networks.
- *The decreasing cost and improved functionality of shared networks are increasing the addressable market for data services.* Frame relay and ATM services are decreasing the cost of enterprise networking while improving the speed and flexibility of these services. This has allowed even the small companies to have the connectivity previously enjoyed only by larger corporations.
- *Improved access technology.* Not long ago, the 14.4 baud modem was the standard dial-up interface for residential Internet access. Next came 28.8Kbps and 56.6Kbps modems. Over the next five years, digital subscriber line (DSL) technology and cable modems promising multi-megabit data rates will be widely introduced across the U.S., further improving the speed and functionality of applications available on the Internet.
- *The popularity of e-mail and basic e-commerce applications among businesses and residential users.* Private e-mail boxes in the U.S. have grown from approximately 20 million in 1990 to almost 80 million in 1997. Increases in available bandwidth, faster processing speeds and the proliferation of intranets and extranets will foster the growth of new bandwidth-intensive applications that include full-motion video, and digital-quality audio.
- *New data services.* New services will deliver information to users' PCs over broadcast spectrum, new wireless networks and upgraded high-speed copper, coaxial and fiber plant.

We estimate the domestic market for data services at approximately \$25 billion. This includes Internet access, enterprise data services and dedicated connectivity. While only a small part of the estimated \$175 billion total domestic telecommunications service market, the strategic nature of these services will lead to changes in the telecommunications landscape far more profound than these numbers suggest.

The strategic importance of data

Where the growth is

With increasing competition and continued pressure on pricing, traditional carriers are working harder than ever to maintain historical growth rates. Local service growth, as measured by the number of new access lines installed, is approximately 4-5% per year. Revenues have actually grown somewhat faster as penetration of enhanced services such as call waiting and caller ID gain acceptance.

The domestic long-distance market has grown at a low- to mid-single-digit annual rate for the past three years. Revenue per minute, however, continues to fall. This is likely to accelerate as the RBOCs begin to offer in-region long-distance and new providers such as Qwest, IXC and Level 3 work to fill their networks. New technologies such as Internet telephony are also likely to reduce the revenue per minute long-distance companies currently earn. We project the domestic long-distance industry will experience 1-3% revenue growth over the next five years. However, the changes taking place in this sector are happening so fast that long-distance revenue could actually fall over this period.

Data services, which include Internet access and enterprise data service such as frame relay and ATM, and dedicated connectivity are growing at an estimated five-year CAGR of 30-40%. Over the next five years, we expect data services will account for approximately 75% of the total incremental growth in the industry and represent almost 40% of telecommunications service spending in 2002.

“Stickiness” of data

The strategic value of data services, however, goes well beyond their rapid growth. Due to the complex nature of data service and the high degree of customization required, the cost of switching providers is high. This reduces churn, keeping pressure on net subscriber acquisition costs—which can lead to improved margins.

To illustrate this concept, consider Intermedia Communications, which provides frame relay service for New York State and the New York State Lottery. Every grocery and drug store in the state where customers can buy a lottery ticket has access to Intermedia's frame relay network. The work entailed to change each of these connections throughout the state, we believe, makes it unlikely Lotto will change providers for a 10% cut in rates. This compares with long-distance service where, for a couple of pennies per minute in savings, millions of customers seek new providers.

Figure 5
Estimated domestic telecom services spending, 1997

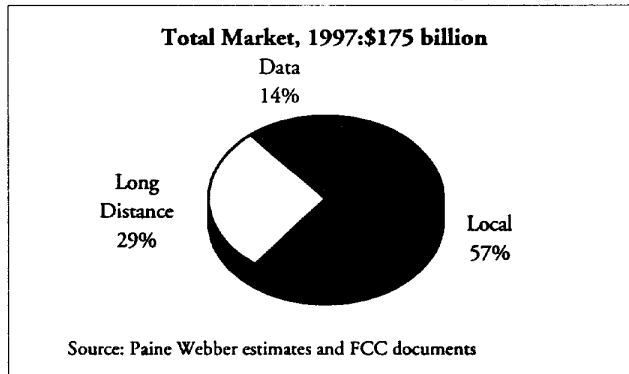


Figure 6
Estimated domestic telecom services spending, 2002

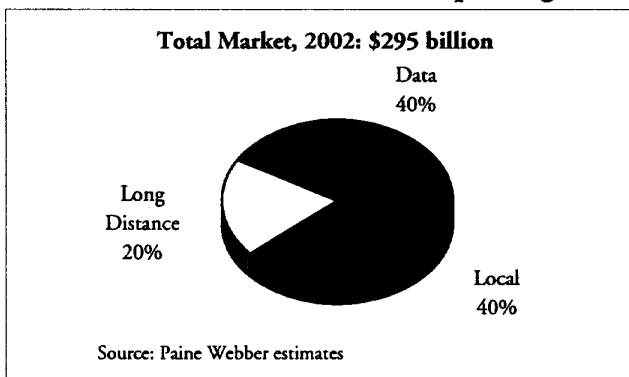
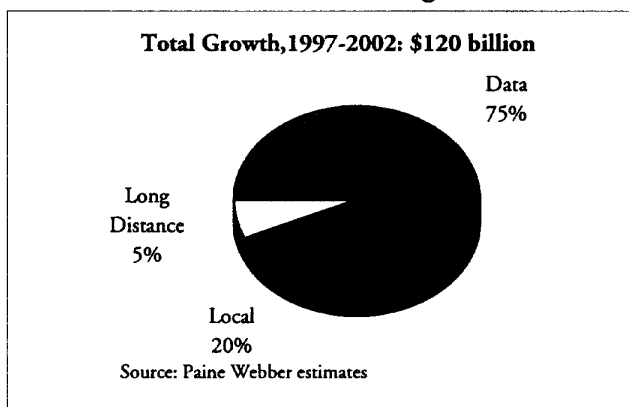


Figure 7
Estimated share of telecom service growth, 1997-2002



Other offerings such as network management and managed router service increase the level of customer interaction while bringing the service provider deeper into the company's operations. Down the road, data services will proliferate in the business and residential markets and bundling will become commonplace, causing churn in the industry to fall dramatically. This will make it more difficult to achieve growth internally, placing a premium on

time to market and making growth through acquisition more prevalent in the industry.

Where the margins are

Gross margins earned on data communications revenues are among the highest in telecommunications services. Internet access typically yields gross margins of 60-80% in the business market and can lead to the provision of other high-margin, add-on services such as web hosting, network security and e-mail administration. Enterprise data applications such as frame relay and ATM service can generate margins of 50-70% on mature networks.

Importantly, the "stickiness" of data services should help prevent the rapid margin erosion we have seen for services such as long-distance and dial-up Internet access where switching costs are minimal. Thus data services not only represent the best way to grow the top line, they present an opportunity to earn attractive margins while positioning the company to compete effectively in the future.

Bundling

The demand for data services by small and medium-sized business customers gives CLECs an opportunity to bundle voice and data together in an easy-to-manage product offering. While large corporations have the personnel to integrate and support the services of numerous vendors, these companies rarely have the resources required to monitor Internet access, LAN management, enterprise data and voice services from separate providers.

In purchasing these services from one provider, small and medium-sized companies effectively outsource their communications needs, reducing staffing and equipment costs while improving overall productivity. For the CLECs, layering on new, value-added services increases revenue per line. As these add-on services typically generate higher margins, profitability per customer improves. In better leveraging the customer connections, network and back-office infrastructure, higher returns on invested capital can be earned.

Network economies

With a single carrier providing both voice and data services, infrastructure in the carrier network and at the customer site can be rationalized. The CLECs are the driving force behind this movement. TCG's CERFtone, Intermedia's Single T, e.spire's Platinum service, GST's VITAnet and ICG's NetWorks are products that deliver voice and data over the same circuit.

For customers, this approach lowers the cost of leasing the equipment necessary to operate two independent networks as well as the personnel costs necessary to support them. The CLECs hope this strategy will help them become the low-cost providers, enabling them to compete with the RBOCs when regulatory constraints are erased.

Integrated voice and data also fits well with the increasing use of enterprise networks to carry voice traffic and positions the CLECs to respond to similar changes taking place in carrier networks where technical convergence is also making rapid progress.

The increasing capacity and complexity of nationwide data networks combined with new technology is making them increasingly well suited to transmit both voice and data traffic. We expect this trend to continue on both sides of the demarcation line until voice becomes just another application on these converged next-generation networks.

Making the call

As data services have become a larger portion of business telecommunications spending and data networks take on more of the functionality of the voice network, buying power within companies has shifted toward the MIS departments. These people are more comfortable working with data networking equipment and data service providers. Eventually, we believe the voice service will be "thrown in" with the data service, giving strategic advantage to carriers providing Internet access and enterprise data services.

Integrated communications providers and the vulnerable middle market

We believe the CLECs are well positioned to be the communications providers of choice to middle-market business customers. The CLECs' ability to integrate voice and data services and provide a high level of customer service allows them to effectively address the changing needs of this market segment. These small, speedy competitors are unencumbered by the legacy systems and the "rate of return" mindset pervading the incumbent operators that currently control the market.

The CLECs' competitive advantage lies in their ability to provide customized, bundled service and support to small and medium-sized businesses. This market includes companies that spend between \$500 and \$10,000 per month on voice and data services, a revenue opportunity of \$70 billion annually.

The RBOCs are currently prevented from offering inter-LATA voice and data services and have been slow to

develop Internet capabilities. However, this is not the main factor affecting their ability to compete for small and medium-sized business customers. The RBOCs do not have the customer-focused mindset or support systems required to effectively service this market.

We believe this cultural reality is harder to break than installing a nationwide data network or buying a long-distance company and will prevent the RBOCs from mounting a significant defense as they watch market share shift to alternative carriers.

In the section below, we describe the range of services the CLECs provide to the vulnerable middle market. We explain the methods used to provision these services and the attractive economics these carriers face.

Figure 8

Revenue mix

Revenue Mix (1Q98)	ELIX	ESPI	GSTX	ICIX
Data and Internet	16%	34%	9%	27%
Switched local	30%	30%	16%	25%
Long distance	9%	0%	45%	33%
Dedicated access and other	45%	36%	30%	16%

Source: PaineWebber and company published data.

CLEC services

Local switched voice

Voice service remains the largest revenue opportunity for the CLECs. Local switched voice generated approximately \$100 billion in revenues in 1997. Incumbent carriers accounted for over \$98 billion of this amount serving over 95% of all access lines. The CLECs as a whole served between 2-3 million access lines at year-end 1997.

The Telecommunications Act has forced incumbents to allow competitors to lease individual elements of their networks at wholesale rates. This offers the CLECs a number of ways to provide local service ranging from total service resale (TSR) to full facilities-based competition. In between are intermediate offerings that have different economics associated with each.

Figure 9

The seven unbundled network elements

Network Interface Devices
Local Loops
Local and Tandem Switches
Interoffice Transmission Facilities
Signaling and Call-Related Database Facilities
Operations Support Systems
Operations and Directory Assistance

Source: PaineWebber.

Dozens of variables go into determining the gross margins and returns on capital of each service option. Below we compare the economics of the most often employed provisioning methods in the context of Bell Atlantic's agreement with the New York State Public Service Commission:

Total service resale (TSR)—TSR is employed when a new competitor has no facilities in place in a market and resells the services of the incumbent carrier. While this method requires the least capital, TSR generates gross margins that are too low to sustain a long-term business model. State-mandated ILEC discounts give competitors a wholesale rate roughly 20-25% below retail pricing. A 5-10% discount is generally given to customers to entice them to switch carriers. Billing and bad debt will take another 5-10% apiece, leaving an operator with little or no margin even before sales and marketing expenses are considered.

Figure 10

TSR lines in service, 12/97

	<u>Resale</u>
AIT	396,004
BEL	167,081
BLS	216,230
SBC	521,431
USW	201,475
TOTAL	<u>1,502,221</u>

Source: FCC.

CLECs often use TSR to build share in a new market before putting in network infrastructure. While this approach creates additional losses leading up to full deployment in a new city, it decreases time to market, and lowers risk by establishing customer demand for service before capital is invested.

UNE-P or Unbundled Network Elements—Platform—Also called "rebundling," UNE-P is similar to TSR in that a carrier leases all of the elements of an incumbent's network but pays an individual price for each based on the forward-looking cost of each service. When all the service elements are recombined, UNE-P offers competing carriers deeper discounts than TSR despite the fact that it is essentially the same service method.

Importantly, UNE-P also allows the competing carrier to retain access charges paid by long-distance companies for local termination and to receive reciprocal compensation for termination of local calls from other LECs. This is not true of TSR, where access charges accrue to the incumbent. The results of these deep discounts and new cash

flow streams are discounts that can reach as high as 50%, allowing new entrants to build market share before installing their own facilities without incurring the substantial losses associated with TSR.

Bell Atlantic's draft agreement with the New York Public Service Commission states that as a condition for entry into the New York interLATA market, Bell Atlantic will provide UNE-P to new entrants under certain circumstances for a period of four years. The combined UNE-P discount (including the effects of access charge revenues) is substantially higher than the 20% achieved under TSR. These margins make it economical to begin selling local service in new markets years before installing new facilities, dramatically lowering the cost of entry.

UNE-L or Unbundled Network Elements—Loops—Also referred to as "switched resale," this method is employed when the CLEC owns a switch in a given market but leases last-mile connections to customers from the incumbent. Loops refer to the twisted copper pair that run from the customer premises to the ILEC central office. Access to these facilities is given to certified CLECs at rates established by each state.

Switched resale is an increasingly popular approach. Gross margins on basic local service range from 40%-60% while the modest capital cost gives the carrier a larger addressable market for each cap ex dollar spent versus a complete network overbuild. Furthermore, the prudent use of investors' funds and efficient asset allocation enable CLECs employing UNE-L to expand rapidly into new markets and produce high returns on invested capital as they become profitable.

The RBOCs have been slow to make loops available to new competitors, however. This is due to the local network architecture and support systems, which were not originally designed to allow lines to be reassigned to another carrier. Technical problems have been exacerbated by the RBOCs' desire to slow the development of meaningful competition in their regions. At year-end 1997, only 123,293 loops had been made available to competing carriers by the RBOCs.

Figure 11

RBOC provided unbundled loops, 12/97

	<u>UNE-L</u>
AIT	68,134
BEL	32,431
BLS	8,448
SBC	13,940
USW	340
TOTAL	<u>123,293</u>

Source: FCC.

Owning the switch in a UNE-L offering is advantageous for two reasons. First, it allows the carrier to collect access charges from IXCs while making it eligible for reciprocal compensation from other LECs. Secondly, owning the switch enables the CLEC to control how service is delivered, allowing integrated product offerings that reduce churn, improve margins and differentiate the company from the incumbent.

As markets mature, carriers can decide to deploy local fiber on a case-by-case basis if the economics become justifiable. T1 lines have become the preferred circuit used by CLECs to provide voice and data communications over a shared line. T1s are leased from a facilities-based provider (typically the ILEC) to provide service to customers en lieu of a single twisted-pair access line. Prices for T1s have been falling rapidly in major markets across the country, further improving the economics of this provisioning method.

Full facilities service provision—Serving customers in buildings connected to CLEC switches with CLEC fiber is the holy grail of service provision. Customers' traffic does not touch the incumbent's facilities except to hand off calls for local termination. Gross margins on these revenues can reach 80%. The high capital expenditures required to install fiber for local transport and last-mile connections, however, make this approach cost prohibitive in areas outside densely populated business districts.

A note on access lines—Traditionally, the RBOCs have all counted access lines the same way. A 64k phone line is counted as one line regardless of whether it is a trunk line plugged into a private branch exchange (PBX), a modem line hooked up to a fax machine or a Centrex line connected directly into a user terminal. The CLECs, however, assign different values to each line depending upon the purpose it serves. The reasoning behind this is that more revenue per month is generated from trunk lines than Centrex lines as there is typically higher usage over a trunk line. Modem lines may also experience greater revenue per month. This result is CLEC access line figures that are difficult to compare with each other or with those of incumbent providers.

Long-distance

Long-distance service is another important revenue opportunity for the CLECs in the near and medium term. We estimate the domestic long-distance market for voice service to be approximately \$50 billion, growing at a low-single-digit annual rate. The CLECs are increasingly bun-

dling local and long-distance voice service, which increases revenue per line and gross margin per customer. As the CLECs continue to add access lines, their penetration of the long-distance market should increase proportionally. New developments in telecommunications related to the growth in data communications, however, are likely to change the economics of providing this service over the next five to ten years.

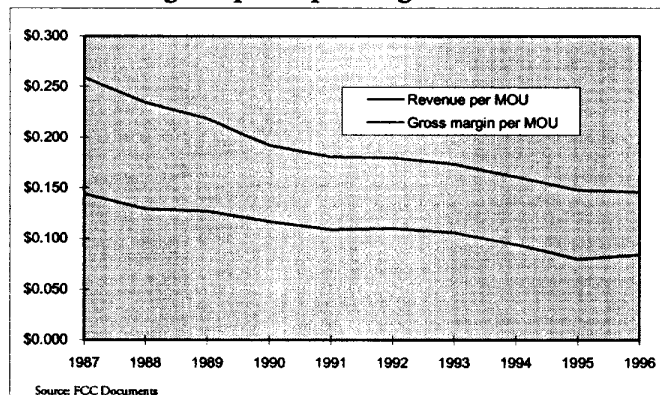
The increased capacity and functionality of data networks will have the most dramatic effects on the long-distance industry. At the enterprise level, businesses have been rapidly deploying shared networks based on frame relay, ATM and IP technology. These networks are increasingly being used for intracompany telephony. Calls between any two sites with access to the enterprise network become essentially free regardless of the distance between them. As the bandwidth and number of locations served by these networks increase, functionality will improve and the amount of business voice traffic cleaved from the public networks will grow.

This has huge ramifications for the Internet, which has become virtually ubiquitous. Using the Internet, calls between any two locations with Internet access become virtually free. There are approximately two dozen companies manufacturing Internet protocol (IP) gateways, which facilitate voice-over-the-Internet (VOIP). The availability of inexpensive, highly functional equipment should speed deployment of this technology in both enterprise and carrier networks over the next few years.

AT&T, Qwest, IDT, ICG and others have announced plans to route long-distance voice traffic through IP gateways to dodge access charges and lower the cost of service to end users. New competition from the RBOCs will also put pressure on gross profit per long-distance minute of use. Many carriers now offer long-distance service to their largest business customers at cost if the carrier can bundle the data services as well. To adapt to this new environment, long-distance companies are repositioning themselves as data carriers.

To effectively offer data, the long-distance companies must have a strong base of local assets. MCI's investment in MCImetro, WorldCom's purchases of MFS and Brooks Fiber, and AT&T's purchase of Teleport underscore this imperative and highlight the strategic importance of data-focused CLECs.

Figure 12

Revenue and gross profit per long-distance MOU**Internet access**

Businesses of all sizes are rushing to get online. Penetration is highest among the Fortune 500, over 90% of which claim to offer employees Internet access. The number falls to approximately 20% for companies with less than \$1 billion in revenues, presenting a huge growth opportunity for carriers that provide access.

To date, the RBOCs have not focused on Internet access provision, leaving the door wide open for alternative providers to offer service to the small and medium-sized business market. The CLECs' response has been to purchase Internet service providers (ISPs), increasing the value of their bundled offering and creating another way for the CLECs to differentiate their service from the incumbent's offering.

Figure 13

Recent CLEC acquisitions of ISPs

Acquirer:		Target:
MFS	==>	UUNet
Teleport	==>	CERFnet
Intermedia	==>	DIGEX
ICG	==>	Netcom
e.spire	==>	Cybergate
GST	==>	Whole Earth
WorldCom	==>	CompuServe
WinStar	==>	GoodNet
RCN	==>	Erol's

Source: PaineWebber.

Business customers generally require some form of dedicated access to the Internet. CLECs provide ISDN (128 Kbps) or T1 (1.544 Mbps) access and may offer speeds as high as fractional and full T3s (45 Mbps). To provide this service, a CLEC that operates as an ISP will install its own circuit or resell an ISDN or T1 connection from the ILEC. The ISP will typically make a small spread on resold lines and generate margins of more than 80% on owned facilities. A port charge is also levied for the actual connection to the CLEC's Internet backbone depending on the speed of the connection. T1 Internet access will generally retail for \$1,000-1,500 per month, depending on the distance of the customer from the central office.

As the ISP for small and medium-sized businesses, the CLECs are in a good position to leverage this relationship through the provision of related services. These include web hosting, network security, e-commerce applications and telephony using VOIP. Companies in this target market often do not have the technical expertise to handle these functions in house, so a local presence with high-quality customer support is critical. This again plays to the strength of the CLECs, increasing margins and binding the customer more tightly to the provider.

Shared network services—What people mean when they talk about data

Prior to the 1990s, large companies generally moved intracompany data among remote offices through the use of private networks composed of leased lines. These networks became very expensive and difficult to manage as the number of sites connected and the distances between them grew.

The 1980s saw rapid growth in client-server architecture and the use of local area networks (LANs) to share data, applications and other scarce resources among users. Small and medium-sized businesses soon became dependent on their corporate LANs and needed to extend the benefits of this architecture to remote locations. The advent of shared data services such as frame relay and ATM soon provided the connectivity these companies required over a more efficient and less expensive carrier-operated network.

Frame relay—The backbone of business communications

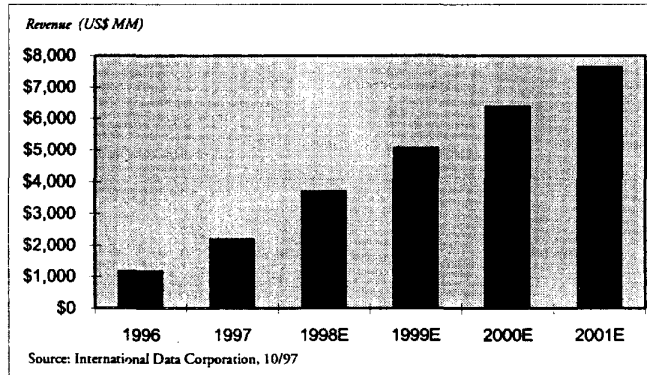
Frame relay is the fastest-growing enterprise data service in U.S. the today. It is used in virtually every industry to move data traffic between companies' remote locations.

While LAN connectivity remains the driving force behind frame relay's growth, retail stores conducting credit card checks, ATMs processing bank account information and travel agents booking reservations all rely on frame relay service to transact daily business.

The domestic market for frame relay service is expected to generate over \$7.5 billion in revenue by the year 2001, equating to a 45% compound average growth rate for the period from 1996 to 2001. The growth is being driven by small and medium-sized businesses that could not afford expensive private networks in the past and instead relied on dial-up connections for corporate connectivity.

Figure 14

Projected domestic frame relay revenue growth

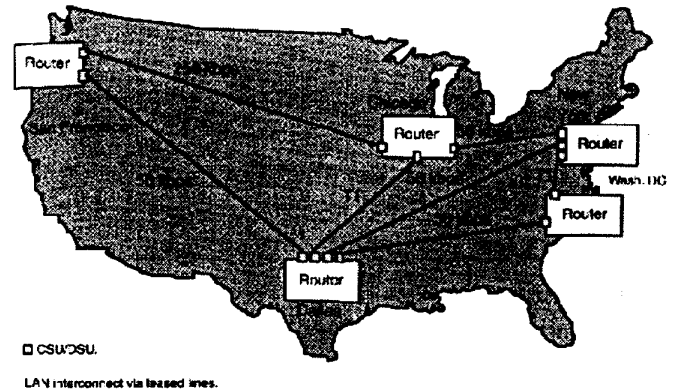


Fortune 1,000 companies have been slower to convert their private networks to frame relay. Many are not ready to shed these mission-critical networks for what may seem to be incremental savings. The high level of security offered by private networks is also important to large companies operating proprietary networks. Instead, these corporations are implementing frame relay along side their private networks and gradually moving traffic over as they become comfortable with the reliability and service standards offered by today's carriers.

Below are two examples of enterprise networks. Figure 15 is an illustration of a corporate network that uses leased lines to connect the LANs at five locations. This requires seven leased lines, some of which stretch over a thousand miles. As leased lines are generally distance sensitive, this can be very expensive. Fourteen CSU/DSU ports are also required to connect all the locations. A CSU/DSU is a component of an enterprise data network that connects the internal computing environment to digital phone lines.

Figure 15

LAN interconnection via leased lines



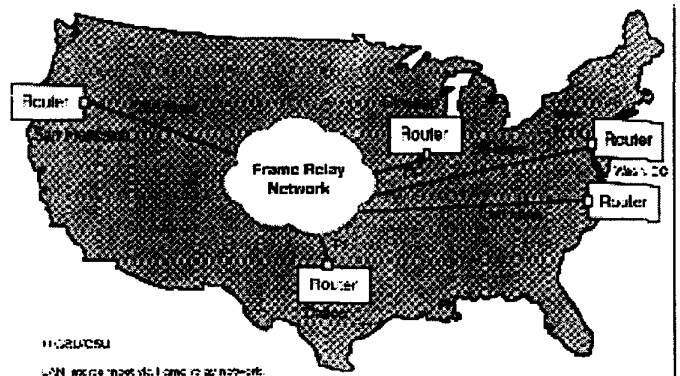
Source: Broadband Communications, Balaji Kumar (McGraw-Hill, 1995).

Below is the same WAN configuration connected through the use of a carrier frame relay network. Frame relay networks are operated by most facilities-based long-distance carriers, ILECs, certain value-added networks such as CompuServe (now part of WorldCom), and many CLECs. These companies install frame relay switches in a number of locations and interconnect them with high-capacity lines. They can then sell service to corporate customers needing connectivity between these locations.

To install service, a customer leases or buys a frame relay access device (FRAD) or router that connects the company's internal computing environment with the frame relay network. This equipment can be purchased or leased from the provider. FRADs and routers encapsulate data from the LAN into frame relay packets and send the packets out to the network via the CSU/DSU.

Figure 16

LAN interconnection via frame relay network



Source: Broadband Communications, Balaji Kumar (McGraw-Hill, 1995).

Software-based private virtual circuits (PVCs) are established in the network (represented in the figure above by a cloud) between the locations the customer wishes to interconnect, ensuring traffic travels to and from these specified endpoints. For example, the San Francisco office would establish PVCs between its offices in Chicago, New York, Washington and Dallas to exchange data files, email and other forms of data traffic with each location.

The frame relay network requires only five leased lines as opposed to seven in a private network, a savings of almost 30%. Additionally, a national provider will have frame relay points of presence (POPs) in each of the above cities. This will shorten the length of the leased lines, further decreasing the cost of access. The number of CSU/DSU ports required to operate the network is also reduced, cut from 14 to five. This lowers equipment costs. The more locations a customer adds to its network, the greater the savings versus private networks. Consider the savings the use of frame relay would generate for a company with 300 sites. As a rule of thumb, frame relay is 30-50% cheaper than private networks while providing better reliability and network efficiency.

The basics

The frame relay packet itself consists of the header, data payload and checksum all packaged together by the FRAD or router on the customer premises. The header contains the data link connection identifier (DLCI), which identifies the PVC, telling the network where the packet is being sent and to which stream of data the packet belongs. The header also contains signaling information the network needs to manage congestion. The user data can be of varying type and length, typically ranging from 256 to 8,192 bytes. The checksum follows the user data and allows the network to determine the integrity of the packet. Packets that fail are discarded and must be retransmitted.

Figure 17

The "frame"

Header 2 Bytes	Payload (256 to 8,192 Bytes, variable length)	CRC (2 Bytes)
-------------------	--	------------------

Pluses:

Extremely flexible
Cheaper and more reliable than private networks
Require less support
Pay for what you use

Minuses:

Not generally available for T3 connectivity or higher
Rudimentary quality of service not suitable for certain applications

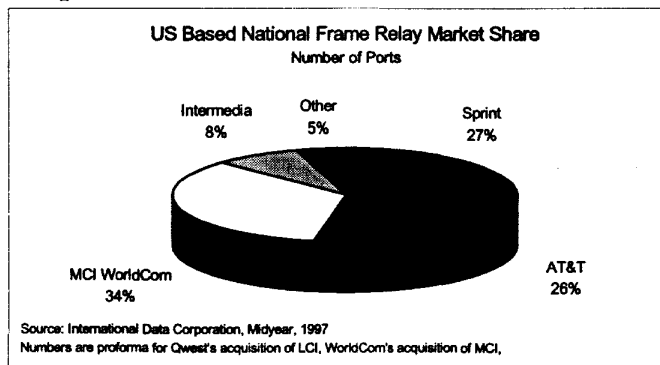
Source: PaineWebber.

Although each carrier's pricing scheme is different, there are generally four elements to the pricing structure of most frame relay offerings.

- *Port speed*—Each FRAD is connected to the network via a "port" on a frame relay switch at the carrier's POP. The port speed determines the maximum rate at which data from a customer location enters the network. Customers pay a flat rate port charge depending on the speed selected. Port speeds for frame relay generally range from 56 Kbps to 1.5 Mbps.
- *PVCs*—Customers also pay a flat monthly rate for each PVC, based on the distance between sites, although these rates are becoming increasingly distance insensitive. Customers can decide whether each PVC is authorized for one-way or two-way traffic. The number of locations connected through a frame relay network will increase the cost.
- *Committed information rate (CIR)*—Customers pay a charge for the CIR chosen on each PVC. The CIR is the data rate guaranteed a customer during periods of high network congestion. If traffic on the network is low, customers can burst up to their port speed. If traffic on the network is high, the network drops packets that have been marked "discard eligible" in the header and the user will get data rates equal to its CIR.
- *Access*—Customers pay a telco charge to have their local area networks connected to the provider's frame relay cloud. This is often done using a dedicated 56Kbps or 384Kbps line. Redundancy on this line is often provided using ISDN dial backup. The cost of access varies market to market and is generally determined by the capacity of the leased line and the distance from the customer location to the carrier POP. This gives carriers with a large number of POPs spread throughout the country a cost advantage over carriers requiring customers to lease long circuits because the closest POP is hundreds of miles away.

U.S.-based providers of interLATA frame relay service generated approximately \$1.9 billion in revenue in 1997. A combined WorldCom/MCI/CompuServe will be the largest domestic provider of this service, with an estimated 35% of the total ports in service. AT&T and Sprint both have approximately a quarter of the market. These three focus primarily on providing service to the Fortune 1,000. The remaining 13% is divided between smaller IXC's such as Cable & Wireless and Qwest and CLECs such as Intermedia Communications.

Figure 18

Competitors

The market for local frame relay service in 1997 was estimated to be approximately \$340 million. This market continues to be dominated by the RBOCs. For frame relay customers requiring interLATA carriage, the RBOCs have established network-network interfaces (NNIs), which allow carriers to exchange traffic with providers that can provide interLATA services. Regional and domestic carriers often establish NNIs to gain a national or international footprint, allowing them to better serve customer needs.

Economics

The large lead the major IXCs have in the frame relay market makes them less likely to cut prices. To date, the IXCs are typically not price competitive with the RBOCs but continue to dominate the business due to their high-quality networks and interLATA capabilities. The CLECs correctly view this competitive situation as an opportunity. With the IXCs, they can compete based on price and win. The CLECs will also compete favorably with the RBOCs on customer service (so important to the resource-constrained small and medium-sized business) after Section 271 authorization (see section on page 20) is given and the RBOCs have had the opportunity to buy or build national data networks.

Margins on frame relay are difficult to determine, as carriers are hesitant to provide the information. Profitability generally depends on network loads, the percentage of traffic that remains on the network (versus terminating on another carrier's network through an NNI), and the number of nodes or "ports" connected to the network. A mature network composed of high-capacity lines that are owned or have been secured through long-term leases will earn gross margins of 50-65%. We expect the majority of the CLECs to earn gross margins of 35-50% as their networks grow and they rely less and less on NNIs to terminate traffic.

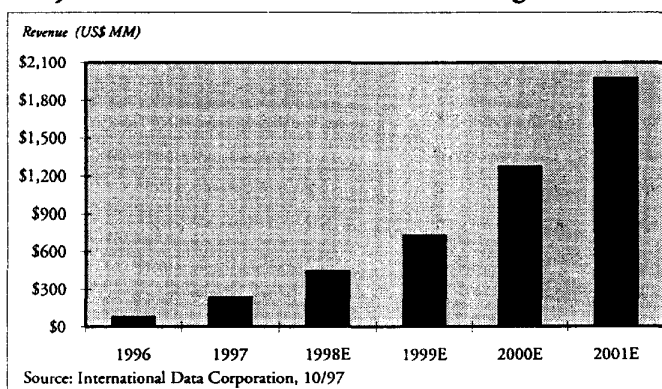
We believe gross margins in frame relay will have greater staying power than gross margins in long-distance have had as the market becomes more competitive. Switching costs are extremely low for long-distance. No equipment or service call is required for a company to change long-distance providers. The complexity of frame relay service, where new equipment must be installed and PVCs established to switch service, will discourage customers from changing providers based on incremental cost savings from a new carrier.

ATM—Moving to the periphery

Companies requiring higher-capacity connections than those currently available from frame relay networks may choose to upgrade to Asynchronous Transfer Mode (ATM) service. ATM is another switching technology that transfers packetized information at faster rates than frame relay while providing varying levels of quality of service (QoS). The current market for ATM service is small, as most companies feel no immediate need to upgrade their networks with more expensive ATM technology. However, as bandwidth requirements continue to grow, the popularity of ATM service is expected to explode.

Long-distance carriers are deploying ATM switches in their backbones to increase bandwidth efficiency of fiber networks. As the price of equipment falls and the demand for bandwidth rises, ATM is becoming more attractive as a technology for shared network service similar to frame relay. Carriers are moving ATM technology from the core of their networks to the periphery and soon will deliver gigabit speed network access to customer sites. Although an expensive alternative to Fast Ethernet, ATM can also be used in the corporate LAN, creating the possibility of end-to-end ATM networks.

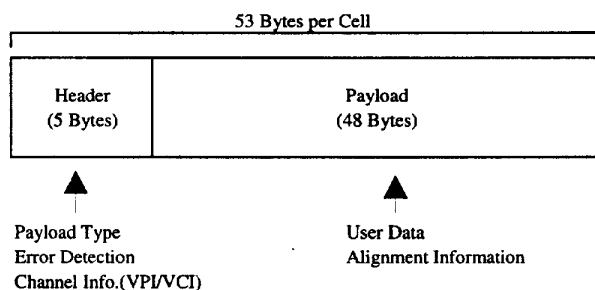
Figure 19

Projected domestic ATM service revenue growth

High data rates are not the only thing drawing carriers to ATM. The protocol supports four priority levels (instead of two with frame relay), which enable the provision of different quality-of-service levels. This allows ATM to effectively deliver high-quality telephony, plus data, video and multimedia applications all over the same network.

Unlike frame relay "frames," ATM packets, or "cells," are of fixed length, containing 53 bytes of data each. The first 5 bytes are the header. The header contains information regarding what type of payload the cell is carrying, error-detection information, and channel information that specifies the path to be taken by the cell. The remaining 48 bytes house the data payload.

Figure 20
The "cell"



Pluses:

Quality of service allows transmission of time sensitive information such as voice and video at Gigabit data speeds.
Can be used in LANs and WANs
Standardized

Minuses:

Overhead: almost 10% of the data conveyed within a cell carries no usable information
The fixed length of a cell means that the payload is rarely filled to capacity

Source: PaineWebber.

The uniformity of the packets allows much of the functionality of ATM switches to be burned into the hardware, increasing processing speed and allowing faster data rates. Carriers are running ATM at 10 Gbps in their backbones. ATM LAN speeds of 622 Mbps are possible, allowing applications like CAD/CAM, imaging, visualization and multimedia functions such as full-motion video to be delivered to the desk top.

ATM will play a core role in many CLECs' plans to deliver bundled services. Companies such as GST, Intermedia and Electric Lightwave have announced plans to use ATM and integrated circuits to deliver bundles of these next-generation products to midsized companies that want the functionality but could not afford the high cost of service and support characteristic of these offerings in the past.

Virtual private networks—Ready for prime time

Virtual private networks (VPNs) have taken the idea of a shared network a step further. Instead of contracting with a carrier to provide transport for corporate data, companies with VPNs use the Internet to move traffic. In this context, the Internet can be viewed as the world's largest shared data network.

VPNs take the form of intranets and extranets. Intranets generally interconnect a company's own locations, functioning much like an enterprise network using frame relay or ATM. Extranets are intranets that include suppliers, customers and other users given access to the network.

VPNs can be provisioned through an ISP, or can be self-administered with company-installed equipment. Many ISPs, including AT&T, GTE, and UUNet, offer VPN services. These providers place VPN security equipment at customer sites. Special modems offering dial-up remote access can also be provided. Additional services such as network security and the use of less congested transmission facilities are also attractive to corporate users interested in a VPN service. Self-administered VPNs are generally created using a stand-alone device or through the addition of special software to a network server or router. These products offer security but relatively few other services.

Self-administered VPNs appeal most to large companies that like to keep control of their own network security and have the staff to support them. The primary benefits of VPNs are the low cost and universal reach the Internet brings. Local loop connections to the Internet and some hardware and software at each location are all that is needed to get a VPN up and running. Use of the network is essentially free if a company is already paying for Internet access.

The drawbacks are the lack of QoS in the Internet and poor security. The Internet continues to suffer from bandwidth constraints due the rapid growth in carrier traffic. The major interconnection points where carriers exchange IP traffic are notoriously clogged. As the Internet is not operated by any one carrier, pinpointing problems in the operations of a VPN is virtually impossible.

CLEC competitive advantages

The CLECs have a number of advantages over incumbent providers that we believe will allow them to continue to rapidly increase market share over the next ten years.

Below is a brief summary of these factors and how they create one of the most attractive opportunities in telecommunications industry.

The current system of cross-subsidy has created a rate structure in local service that bears little resemblance to the underlying cost structure. Rates for business lines are generally double residential rates while business customers are typically cheaper to service.

As a result, we estimate that 90% of incumbent profits are generated by business customers. This creates an opportunity to undercut incumbents on business access lines while still earning above-average margins. While rate rebalancing (where business rates are decreased and residential rates increased) would negatively affect these economics, it is politically unpopular.

Figure 21

Selected RBOC rates for basic service

Carrier	Bell South ¹	Bell Atlantic	USWest	Ameritech	SBC
Market	Georgia	Maine	Colorado	Indianapolis	Kansas
Residential	\$21.11	\$18.81	\$18.43	\$16.67	\$16.84
Business	\$48.30	\$37.71	\$40.87	\$60.00	\$45.00
Differential	2.3x	2.0x	2.2x	3.6x	2.7x

¹ Rates do not include Atlanta

Source: Company provided data.

We believe few lawmakers will stand aside as residential rates are doubled by "monopolist" phone companies.

With this rate structure in mind, it is easy to understand why the CLECs are largely uninterested in serving the residential market, preferring to concentrate their efforts on high-margin business customers.

⇒ *The customer-focused workforce and entrepreneurial culture of the CLECs give the CLECs a major advantage.*

The CLECs are focused competitors with employees who own shares in their companies. In contrast, the RBOCs evolved as regulated monopolies similar to the electric and water utilities. For decades, these companies were guaranteed a fixed return on their assets and they are now saddled with a workforce that reflects this mindset. Changes in how businesses communicate will benefit flexible, market-oriented competitors that can provide customized products to the middle market, while slow-moving incumbents will spend their energies trying to reinvent themselves.

⇒ *Customers want a choice in service providers.* This was made clear in the long-distance industry when AT&T went from 90% market share to less than 50% in the 15 years after divestiture. The willingness of business customers to change local service carriers despite

delays in provisioning and problems associated with local number portability has established the existence of a strong demand for alternative local service as well.

⇒ *The FCC mandates that ILECs charge all customers in a geographic area the same rate for the same service.*

Within a geographic area there are high-cost and low-cost customers. The ILEC must formulate its common rate accordingly. This creates high-margin business customers and even higher-margin business customers. The CLECs do not have to offer service to all customers and can concentrate marketing efforts on those most attractive.

⇒ *Concentration of business lines benefits CLECs.* There are over 20,000 ILEC central offices (COs) in the United States. However, 70% of ILEC revenues in the business market come from approximately 600 COs. This concentration of business lines, revenues and margins in relatively few COs improves the CLECs' ability to efficiently cream skim high-margin customers and generate high returns on capital invested.

⇒ *TELRIC pricing of ILEC network elements gives the CLECs a competitive cost structure right out of the box.* The Telecommunications Act forces ILECs to lease elements of their networks to competitors at favorable rates. This allows the CLECs to compete on a more level playing field with incumbents without the massive expenditures required for a complete network overbuild.

⇒ *The CLECs can offer bundled packages of services now while the RBOCs are currently constrained from offering interLATA services.* We believe that these constraints are likely to exist into 2000 for some carriers, giving the CLECs time to establish an embedded customer base and a proficiency for combining voice, Internet and enterprise data into a single service offering.

Risks

While we are very positive on the CLECs as a whole, there are certain risks facing each of these companies that can have significant effects on stock prices.

Execution risk—Our estimates suggest that the CLECs will continue to improve the rate at which they attract new customers and provision new access lines. While we believe our assumptions to be reasonable, managing the deployment of infrastructure and customer support sys-

tems required to penetrate new markets at the rate planned can be daunting. This is especially true considering that the CLECs rely largely on the incumbent carrier to provide leased service elements.

While we believe the CLECs are well positioned for continued success and increased market share, we expect many to have problems along the way that may cause declines in share prices. The volatility of these stocks makes them appropriate for investors with a healthy appetite for risk.

Competition—The RBOCs continue to control the vast majority of access lines. As with the liberalization of long-distance, market share is expected to shift to new entrants for the next ten years. However, entry from larger competitors such as the long-distance companies and out-of-region RBOCs could increase competitive pressures on the group, driving rates down and slowing growth.

Regulatory—While the basic regulatory framework has been put in place, certain aspects are yet to be decided upon by the FCC, the courts and state public utility commissions. These include RBOC entry into long-distance, reciprocal compensation, universal service funding and access charge reform. While we do not expect coming rulings to have a material effect on the CLECs' ability to do business, each ruling could have a marginal effect on their ability to meet our financial projections.

Liquidity—The need to maintain liquidity is a challenge, considering the operating losses these companies are expected to generate combined with capital budgets ranging from \$100 million to \$500 million per company per year. As each CLEC adds a new market, losses can be expected to increase as expenses ramp up in anticipation of new revenues. This keeps pressure on gross margins, possibly delaying EBITDA breakeven. So while the potential success a company can achieve grows, the payoff is pushed farther into the future.

Reliance on the capital markets—There is no guarantee the current market environment, which has allowed many of the CLECs to raise cash at attractive rates, will continue. Were the capital markets to become unavailable to the CLECs as a source of funds, many would not be able to execute their business plans and the price of their shares would likely come under pressure.

Sensitivity to interest rates—With highly leveraged balance sheets and free cash flow years away, stock prices are highly sensitive to changes in interest rates. A significant increase in interest rates is likely to have an adverse effect on the group as a whole.

The road ahead

Bits are bits

Convergence is coming and the RBOCs and large IXC's have the cap ex plans to prove it. They understand that as competition spills over from long-distance into the local market, margins will begin to fall. The provision of data services offers the most effective means of insulating revenue streams from downward pricing pressure.

CLECs without strong data capabilities will develop and implement a data strategy over the next 12-24 months. We expect IXC's to spend billions upgrading their networks to increase data rates and to improve service reliability and end-to-end connectivity. Meanwhile, the RBOCs will build and buy interLATA voice and data infrastructure to serve new and existing customers with a full-service offering.

As investors gain a better understanding of the strategic importance of data service, we believe carriers with a strong data focus will be rewarded, all else being equal.

Section 271 certification

The first RBOCs should receive Section 271 approval, allowing them to compete in the long-distance market in their home regions, in 1999. We expect authorization for other RBOCs to drag into 2000. While this will make the RBOCs' offering more competitive, we do not expect this to substantially affect CLEC growth rates in the near term.

GTE and SNET are both able to bundle long-distance and local service and have had tremendous success in selling this product. However, the vast majority of their customers are residences and small businesses. Despite the bundled offering, these incumbent providers are still not addressing the needs of the middle market. Thus we do not foresee any immediate impact. However, RBOC entry is likely to have other effects on industry structure.

Further industry consolidation

RBOC entry into in-region long-distance will be a fundamental change in the industry. We expect many to make acquisitions to fill holes in their product lines. The long-distance market will bring these competitors into direct competition with each other for the first time in what each believes will be a major market opportunity.

We believe the gloves come off when this happens and the RBOCs will begin to compete in earnest for out-of-region access lines. SBC's acquisition of SNET was a "shot across the bow" of Bell Atlantic, foreshadowing further

encroachment on its territories and broader efforts to attract new customers.

The best way for the RBOCs to attack local markets is to buy a CLEC with a strong presence and heavy data focus in a given region. Again we cite the RBOCs' "rate of return" mentality and lack of streamlined operations as the main impediments to their ability to compete. In acquiring a CLEC, an RBOC would gain not only marketing and technical expertise but an organization with an entrepreneurial culture that it can leverage as a separate subsidiary to enter new markets most efficiently.

MCI's losses generated in attempting a broad-based push into local markets caused British Telecom to lower its offer for the company by over \$5 billion. These losses were higher than expected despite the company's success in the highly competitive long-distance industry. The RBOCs have no similar history to rely upon and, despite expertise in local service, can be expected to bring their bureaucratic baggage with them as they enter into new markets.

This experience contrasts with AT&T's local market entry strategy. The company agreed to pay over \$11 billion for Teleport Communications, the leading independent CLEC at the time. Despite what many considered to be a high takeout price, AT&T's stock rose 10% in the weeks following the offer. This positive reaction by the market, combined with MCI's drubbing in response to its greater-than-expected losses make it likely that RBOCs will buy their way into new markets.

The next-generation inter-exchange carriers (IXCs) will also emerge as industry consolidators. Qwest, IXC and Level 3 all have an end-user focus that will require end-to-end networks and a local presence. Qwest's merger with LCI, IXC's investment in PSInet, and Level 3's acquisition of XCOM are the initial moves in this direction.

The "stickiness" of data services also puts a premium on time to market, as taking share in the data services market is more difficult than in voice services.

Increased competition in local services

With the incumbents currently serving 95% of U.S. business lines, the CLECs are clearly still in the early stages of the industry life cycle. Growth is very strong, margins are widening as revenues catch up with and surpass network costs and new providers continue to emerge, opening their doors in markets where competition already exists. As these competitors gain scale, perhaps eliciting a competitive response from the incumbent, pricing pressure will develop, pushing down artificially high business rates.

Competition is also likely to develop from the long-distance carriers and out-of-region RBOCs once Section 271 applications are approved. We believe the UNE-P standards built into Bell Atlantic's draft filing could "age" the CLEC industry cycle prematurely if widely adopted by other states. A 50% discount may entice large long-distance carriers and out-of-region RBOCs to begin a full-scale push to resell business lines. These companies have the near ubiquitous presence, billions of marketing dollars and brand recognition that could stir up competition.

Figure 22

Selected competitors in top domestic markets

Atlanta	Balt./Wash.	Chicago	Dallas
Intermedia	e.spire	Intermedia	Intermedia
E. Spire	Winstar	Focal	e.spire
US LEC	MCI	Winstar	Winstar
Winstar	WorldCom	MCI	MCI
Nextlink	TCG	WorldCom	WorldCom
MCI		TCG	TCG
WorldCom		Nextlink	Allegiance
TCG			ICG
ICG			GST
Allegiance			
Houston	Los Angeles	Miami	New York
Intermedia	Intermedia	Intermedia	Intermedia
e.spire	GST	e.spire	Focal
Time Warner Tel	Winstar	Winstar	Time Warner Tel
Winstar	ICG	MCI	Winstar
MCI	MCI	WorldCom	MCI
WorldCom	WorldCom	TCG	WorldCom
TCG	TCG	<i>Focal</i>	TCG
ICG	Electric Lightwave	<i>US LEC</i>	Nextlink
GST	Nextlink		Allegiance
	<i>Focal</i>		
Philadelphia	Phoenix	San Diego	San Francisco
Winstar	GST	Time Warner Tel	Winstar
MCI	Winstar	Winstar	ICG
WorldCom	MCI	ICG	MCI
TCG	WorldCom	MCI	WorldCom
Nextlink	TCG	WorldCom	TCG
<i>Focal</i>	Electric Lightwave	TCG	<i>Electric Lightwave</i>
	Nextlink		Nextlink
			GST
			<i>Focal</i>

Note: Italicized carriers have plans to enter the market.

Source: PaineWebber and company published data.

Comparing the CLECs—What we look for

Revenue growth and mix

In this stage of the industry life cycle, we expect high-double- and triple-digit growth rates to continue. However, we also consider the mix of revenues in determining the quality of that growth. For instance, margins on long-distance services will continue to see downward pressure while integration services are nonrecurring, making them unpredictable.

Local service has extremely attractive economics, while the ability to grow this revenue stream internally is possibly

the best measure of a company's overall performance. We believe revenue derived from data and Internet service to be equally attractive and strategically important as well. These services provide a large measure of customer control, lowering churn while setting the stage for the service provider to capture a greater share of telecommunications revenue as voice and data networks merge.

Access line growth and mix

New access line installations are key to determining the real rate of growth of a company's core CLEC business. In this high-growth phase, we expect steady improvement in a carrier's ability to provision lines. Due to the unfavorable economics of TSR, CLECs with a high percentage of resold lines typically receive a discount. Direct connections to customers over owned fiber provide by far the best margins, customer control and reliability. Unbundled loops also provide healthy margins and give carriers a larger degree of control over the way service is delivered. On-network buildings are reported by most major CLECs and offer a simplified means to compare the size of the market reached through these two provisioning methods.

Networks

Increased competition in local markets will inevitably lead to pricing pressure. Ameritech recently filed with regulators its intention to rebalance its rate structure—lowering rates for business customers while increasing residential rates—which presages other RBOC moves to be more competitive. This will give the upper hand to CLECs with end-to-end facilities, which provide increased reliability, better margins and effective cost control.

The CLECs and IXC's are constantly faced with the decision of whether to buy or build their own long-haul and local fiber infrastructure. The argument for building fiber plant is that it gives a carrier greater control over the network for future expansion, greater reliability and the potential for high-margin sales of bulk capacity.

In the past six to 12 months, we have seen the supply constraints in the market for long-haul capacity dissipate as new networks from Qwest, IXC Communications, Frontier and Williams have become available for commercial service. Buyers willing to sign long-term leases for large capacity commitments generally find themselves with competitive bids from numerous suppliers.

In this environment, it is often best for a carrier to lease long-haul capacity if no competitive advantage in the construction process exists. These carriers forego capacity

sales and swaps but benefit from improved time to market, favorable lease rates and management's continued focus on the core business. The benefits of leased fiber are substantiated by the fact that most carriers augment their owned networks with leased capacity from other carriers when the benefits of buying versus building are obvious to even the most construction-minded companies.

In the local market, the lack of fiber capacity often reduces a competing carrier's flexibility. In most cases, CLEC management is forced to decide between leasing capacity from the incumbent and building its own fiber infrastructure. The decision should take into account the cost of the network build, the potential revenue opportunity of the market, expected margin improvement and estimated payback time. From a return-on-capital standpoint, fiber plant generally has a depreciable life of 20 years and is likely to last far longer, making the argument for owned capacity compelling given a long-term view of the business.

Considering our outlook on pricing, expectations for market share growth among the CLECs, and the need to offer the highest reliability and customer service possible, we believe the CLECs are best served in the long term by owning local facilities. The opportunity to earn a compelling return on this investment combined with a decrease in business risk should cause investors to favor CLECs less dependent on incumbent carriers. End-to-end facilities also make a CLEC a more likely takeover candidate, as large buyers look to build their own full-service networks.

Again, the opportunity to secure leased fiber on a long-term basis may provide an attractive alternative to building urban infrastructure. Many CLECs have opted for this approach, signing commitments with Metromedia Fiber Network for capacity in East Coast markets.

Operational support systems (OSS)

As the CLECs invest in new infrastructure and personnel, it is important that a company's operational support systems (OSS) keep pace. These systems manage functions such as new line provisioning, customer support and billing. Many companies currently perform these tasks manually, taking down customer requests on paper and shuffling them off to the next stage in the process. Other companies have instituted Lotus Notes-based programs or other measures that automate portions of the process. These methods generally suffice when a CLEC installs 5,000-10,000 access lines per quarter but cannot handle